Flagstaff Watershed Protection Project

Economics Report

Prepared by:
Bob Rich
Forest Operations Specialist,
Southwestern Region

for:
Flagstaff Ranger District
Coconino National Forest
Date- January 27, 2014
Revised February 17, 2014

Table of Contents

To refresh table of contents, highlight all of it and press F9.

List of Tables

The table and figure lists above will not show up unless you have your captions styled properly. Tables should be styled with “Caption Table” and figures should be “Caption Figure”

Introduction

This analysis will address the cost of implementing the Flagstaff Watershed Protection Project. This will include the following costs: surveying and marking cultural sites, marking and cruising timber, road construction, road rehabilitation, road maintenance, preparing contracts, project administration, harvesting trees, hand thinning and prescribed burning.
It does not include the cost of preparing the Environmental Impact Statement for the project.

Affected Environment

Existing Condition

During the November 2012 elections, residents of Flagstaff, AZ approved a $10 million bond to support forest restoration work within key watersheds on the Coconino National Forest and State of Arizona lands. This is one of only a handful of examples in the country where forest restoration work on the National Forests is being funded by a municipality, and the only known instance where such an effort is funded from municipal bonds. Additional funding for the planning effort has been leveraged from the Forest Service in order to retain as much of the bond money for implementation as possible.

Environmental Consequences

Methodology

Implementation of the Flagstaff Watershed Protection Project would require several types of fuel reduction methods and other actions that are related to their implementation. Costs to undertake these activities have been estimated using a variety of methods. These costs are only estimates. Actual implementations cost, especially for logging systems not commonly used in northern Arizona, may vary substantially. The activities that have been analyzed for and the methodology that was used to estimate their costs are:

Cultural Resource Survey Cost

A cultural resource survey and marking of cultural resource sites has already been completed for the project area. The project has been cleared for cultural resources. However if the chosen alternative includes temporary roads outside of existing, surveyed prisms, additional surveys may need to be performed. It is likely that these acres would be small and the survey completed “in house” by the Forest Service. These costs were provided by the Flagstaff District archaeologist, based on past experienced costs.

Sale Preparation Cost

Sale preparation costs are all costs associated with locating harvest units, timber marking and timber cruising. These costs were provided by the Flagstaff District timber management officer based on past experienced costs.

Sale Administration Cost

This is the cost to supervise the logging done by a contractor and to administer the contract. These costs were estimated by the Flagstaff District timber management office based on past experienced costs.

Temporary Road Construction and Rehabilitation Cost

This is the estimated cost for a contractor to construct new temporary roads and rehabilitate the road prism after use. It was estimated using the costs provided in the inter-regional cost guide.

Construction of Relocated System Roads Cost

This is the estimated cost for a contractor to build relocated system roads. It was estimated using the costs provided in the inter-regional cost guide.

Road Rehabilitation Cost (Not including new temporary roads)

This is the estimated cost for a contractor to rehabilitate existing system roads that are to be decommissioned, roads that are already decommissioned and in need of rehabilitation and existing non-system roads that are in need of rehabilitation. It was estimated using the costs provided in the inter-regional cost guide.

Prescribed Burning Cost

This is the cost to carry out prescribed burning. It was estimated by the Flagstaff District assistant fire management officer (fuels) based on past experienced costs.

Net Timber Value

Net timber value is the value of the timber to be harvested as it stands on the stump; it is also referred to as stumpage value. This is the monetary amount that a contractor would be willing to pay the government for the timber or the amount that the contractor would need to be paid in order to harvest and haul the timber from the site.

In May of 2012, the Forest Service awarded the Four Forest Restoration Initiative (4-FRI) contract. This contract specifies a product value for each geographic working circle within the 4-FRI contract area. 4-FRI will be the major market for timber produced from the Flagstaff Ranger District until at least 2021, which will be the end of the current contract period. The value of timber in the working circle that FWPP is located within, is a positive $3.50/ green ton for logs greater than 5 inches on the small end (i.e. the contractor pays the government for the timber) The material that is smaller than this, including limbs and tops, has a negative value of $3.50/green ton (i.e. the government pays the contractor $3.50/green ton to remove this material from the site).

This EIS assumes that these product values indicate the current market value for timber cut on FWPP for ground based harvesting. However due to the steep terrain on much of FWPP, more expensive logging systems capable of working on these steep slopes, such as skyline, steep slope cut to length and helicopter are under consideration. These systems would have a higher logging cost than conventional ground based logging. Conventional ground based logging has the lowest logging cost per ton of any logging system. In order to account for the cost of these higher priced systems and the effect they have on net timber value, logging cost was calculated for all systems and net timber value was adjusted to reflect the increased cost of these more expensive logging systems. For example if a ground based logging cost is calculated to be $25/ton and has a product value of $3/ton and a skyline logging system has a cost of $48/ton, then this increased cost would be subtracted from the ground based product value of $3/ton to show the net timber value of the timber harvested with a skyline system. This calculation would be: $3/ton (product value of a ground based system) - $23/ton (increased cost of a skyline system) = a negative $20/ton product value for the timber harvested with a skyline system. Trees down to a 4” diameter at breast height (DBH) were used in logging cost calculations.

It is estimated that of the standing stem volume in the project area, 85 percent is sawlog size with a value to the government of $3.50/ton, and 15 percent is smaller than this with a value to the government of -$3.50/ton. This yields a composite value for $2.45/ton of stem material logged. It is also estimated that there is approximately 5 tons/acre of branches that would be bought in from the harvest units when stems are logged. This material can be burned at the landing or utilized. If it is utilized it would cost the government $3.50/ton to have it removed.

All logging cost was estimated using the Forest Service's log cost program (USDA FS, version 13.1).

Alternative 1 – No Action

Direct Effects and Indirect Effects

Cultural Resource Cost

A contract for cultural resource survey has already been completed and a cost incurred.
Cultural resource survey = $72,000
Marking of cultural resource sites = $4,000
Forest Service Contract Admin. Cost = $26,000
Total Cultural Resource Cost = $102,000

Sale Preparation Cost

No sale preparation would be done under this alternative and no cost incurred.

Sale Administration Cost

No sale administration done would be under this alternative and no administrative cost incurred.

Temporary Road Construction and Rehabilitation Cost

No temporary roads would be built under this alternative and no costs incurred

Construction of Relocated System Roads

No road construction of relocated system roads would be done under this alternative and no cost incurred.

Road Rehabilitation Cost

No road rehabilitation would be done under this alternative and no cost incurred.

Hand Thinning Cost

No hand thinning would be done under this alternative and no cost incurred

Prescribed Burning Cost

No prescribed burning would be done under this alternative and no cost incurred.

Net Timber Value

No logging would be done under this alternative and no cost incurred or timber value generated.

Cumulative Effects

There would be no cumulative environmental effects under this alternative.

Alternative 2 – Proposed Action

Direct Effects and Indirect Effects

Cultural Resource Survey and Site Marking Cost

Cultural resource survey = $72,000
Marking of cultural resource sites = $4,000
Forest Service contract administration cost = $26,000
Survey new road locations= $2,160
Total Cultural Resource Survey and Site Marking Cost = $104,160

Sale Preparation Cost

7,109 acres of sale preparation @ $120/acre = $853,080
4 task orders/timber sale contracts@ $4,500/contract = $18,000
Total sale preparation cost = $871,080

Sale Administration Cost

7,109 acres of timber sale to administer @ $50/acre = $355,450

Temporary Road Construction and Rehabilitation Cost

14.64 miles of temporary road construction and rehabilitation @ $15,089/mile = $220,903

Construction of Relocated System Roads

1.57 miles of system road relocated @ $11,885/mile = $18,659

Road Rehabilitation Cost

6.03 miles of road rehabilitations @ $9,319/mile =$56,194 (includes 1.44 miles of road 6277)

Hand Thinning Cost

846 Acres @ = $719,100/acre

Prescribed Burning Cost-

5,818 acres of slopes under 40% @ $500/acre =$2,919,546
3,107 acres of slopes over 40% @ $750/acre = $2,331,750
Total prescribed burn cost = $5,251,296

Net Timber Value

Net timber value under this alternative is a positive $274,908. Logging cost calculations for Alternative 2 are shown in Table 1.

Table 1: Logging cost summary, Alternative 2

Logging System	Stump to Truck Cost ($/tons)	Volume/ac (tons)	Acres	Total Volume (tons)	Timber Value ($/ton)	Net Timber Value by Logging System ($)
Ground-based Mechanical	$27	49	5818	285,082	+$2.45	+$698,451
Skyline-Machine Cut	$35	38.5	393	15,130	($5.55)	($83,971)
Skyline-Hand Cut	$41	38.5	271	10,433	($11.55)	($120,501)
Excaline-Machine Cut	$32	38.5	455	17,517	($2.55)	($44,668
Excaline-hand Cut	$37	38.5	172	6,622	($9.55)	($49,996)
Total			7109	334,784		
Non-stem Biomass	N/A	5	7109	35,545	($3.50)	($124,407)
Total Value						+$274,908

Cumulative Effects

There would be no cumulative environmental effects under this alternative

Alternative 3
Direct and Indirect Effects

Cultural Resource Survey and Site Marking Cost

Cultural resource survey = $72,000
Marking of cultural resource sites = $4,000
Forest Service contract administration cost = $26,000
Survey new road locations= $1,820
Total Cultural Resource Survey and Site Marking Cost = $103,820

Sale Preparation Cost

7,137 acres of sale preparation @ $120/acre = $856,440
4 task orders/timber sale contracts@ $4,500/contract = $18,000
Total sale preparation cost = $874,440

Sale Administration Cost

7,137 acres of timber sale to administer @ $50/acre = $356,850
Total Sale Administration Cost = $355,450

Temporary Road Construction and Rehabilitation Cost

9.91 miles of temporary road construction and rehabilitation @ $15,089/mile = $149,532

Construction of Relocated System Roads

1.57 miles of system road relocated @ $11,885/mile= $18,659

Road Rehabilitation Cost

6.03 miles of road rehabilitations@ $ 9,319/mile = $56,194 (includes 1.44 miles of road 6277)

Hand Thinning Cost

832 acres @ $850/acre = $707,200/acre

Prescribed Burning Cost-

5,818 acres of slopes under 40% @ $500/acre =$2,919,546
3,107 acres of slopes over 40% @ $750/acre = $2,331,750
Total prescribed burn cost = $5,251,296

Net Timber Value

Net timber value under this alternative is a negative $992,747. Logging cost calculations for Alternative 3 are shown in Table 2.

Table 2: Logging cost summary, Alternative 3

Logging System	Stump to Truck Cost ($/ton)	Volume/ac (tons)	Acres	Total Volume (tons)	Timber Value ($/ton)	Net Timber Value by Logging System ($)
Ground-based Mechanical	$27	49	5818	285,082	+$2.45	+$698,451
Steep Slope Cut to length	$33	38.5	346	13,321	($3.55)	($47,298)
Helicopter	$70	38.5	973	37,460	($40.55)	($1,519,003)
Total			7137	335,863		
Non-Stem Biomass	N/A	5	7137	35,685	($3.50)	($124,897)
Total Value						($992,747)

Cumulative Effects

There would be no cumulative environmental effects under this alternative

Alternative 4

Direct and Indirect Effects

Cultural Resource Survey and Site Marking Cost

Cultural resource survey = $72,000
Marking of cultural resource sites = $4,000
Forest Service contract administration cost = $26,000
Survey new road locations= $1,780
Total Cultural Resource Survey and Site Marking Cost = $103,780

Sale Preparation Cost

5,264 acres of sale preparation @ $120/acre = $631,680
2 task orders/timber sales @$4,500/each = $9,000
Total sale preparation cost = $640,680

Sale Administration Cost

5,264 acres of timber sale to administer @ $50/acre = $263,200
Total Sale Administration Cost = $263,200

Temporary Road Construction and Rehabilitation Cost

9.20 miles of temporary road construction and rehabilitation @ $15,089/mile = $138,819

Construction of Relocated System Roads

1.57 miles of system road relocated @ $11,885/mile= $18,659

Road Rehabilitation Cost

6.03 miles of road rehabilitations@ $ 9,319/mile= $ 56,194 (includes 1.44 miles of road 6277)

Hand Thinning Cost

438 Acres @ = $372,300/acre

Prescribed Burning Cost-

5,297 acres of slopes under 40% @ $500/acre =$2,648,500
505 acres of slopes over 40% @ $750/acre = $378,750
Total prescribed Burn cost =$3,027,250

Net Timber Value

Net timber value under this alternative is a positive $539,823. Logging cost calculations for Alternative 4 are shown in
Table 3.

Table 3: Logging cost summary, Alternative 4

Logging System	Stump to Truck Cost ($/ton)	Volume/ac (tons)	Acres	Total Volume (tons)	Timber Value ($/ton)	Net Timber Value by Logging System ($)
Ground-based Mechanical	$27	49	5,264	257,936	+$2.45	+$631,943
Total			5,264	257,936	+$2.45	+$631,943
Non-Stem Biomass		5	5,264	26,320	($3.50)	($92,120)
Total Value						+$539,823

Cumulative Effects

There would be no cumulative environmental effects under this alternative

Comparison of Costs by Alternative

A comparison of costs to implement this project is shown in Table 4. All costs are subtracted from net timber value to arrive at a total estimated cost to implement the project.

Table 4: Comparison of costs per alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cultural Resource Survey Cost	$102,000	$104,160	$103,820	$103,780
Sale Preparation Cost	$0	871,080	874,440	640,680
Sale Administration Cost	$0	355,450	356,850	263,200
Temp Road Construction and Rehabilitation		220,903	149,532	138,819
Construction of Relocated System Roads Cost	$0	18,659	18,659	18,659
Road Rehabilitation Cost	$0	56,194	56,194	56,194
Hand Thinning	$0	719,100	707,200	372,300
Prescribed Burning	$0	5,251,296	5,251,296	3,027,250
Costs of Implementation, (not including net timber value)	$102,000	7,594,682	7,516,171	4,619,102
Net Timber Value	$0	+$274,908	($992,747)	+$539,823
Total Implementation Cost (Net Timber Value minus Cost of Implementation)	**($120,000)**	**($7,319,774)**	**($8,508918)**	**($4,079,279)**

References (Literature Cited)

USDA Forest Service March 2013. *Cost Estimating Guide for Road Construction*
USDA Forest Service *Logcost program, (version 13.1)*